National Weather Service Forecast Office Chicago

CHICAGO

Fall 2009
Volume 7, Issue 3

Inside this issue:

NWS Chicago Open House

by Jim Allsopp, Warning Coordination Meteorologist

The National Weather Service Forecast Office in Romeoville will hold an open house on **Saturday October 3, 2009 from 900 a.m. until 300 p.m.**

At the open house visitors will see and learn about:

- NWS surface and upper air weather observations
- Volunteer weather observing networks, including the Coop program, CoCoRaHS, and the Chicago-Rockford Area Snowfall Teams
- The NOAA and NWS organization, the Chicago Weather Forecast Office area of responsibility, and programs
- An overview of NWS web pages and NOAA Weather Radio
- Displays of satellite, Doppler radar, and weather maps
- Forecast operations and the warning decision process
- A look at the Doppler radar data acquisition building (sorry, visitors are not permitted inside the radar dome)
- An overview of computer systems and communications
- Hazards of flooding with an interactive floodplain model demonstration
- How river levels and flows are measured by the U.S. Geological Survey (USGS)
- Amateur radio operations for severe weather

If you have a NOAA Weather Radio and need help programming it for the areas you would like, please bring the radio with you. We will have people there who will be able to assist you.

The Will County Emergency Management Agency and American Red Cross incident command vehicles will be on display. Some other agencies that will be here are the USGS, the Midwest Regional Climate Center, Romeoville

NWS Chicago Open House (cont)

Emergency Management Agency, Lockport Township Fire Department, and Boy Scout Troop 13.

The open house will be held rain or shine. Each tour will take around 35-45 minutes. The first tour will begin at 900 a.m. and the last will begin around 300 p.m. There is no registration. People will be taken first come, first served. It is open to all ages – a great outing for Cub Scouts, Boy Scouts, Girl Scouts and other youth groups.

For security reasons – no bags, backpacks, purses are permitted in the building. Please leave them in your car. Cameras are allowed.

Picture from the 2007 NWS Chicago Open House

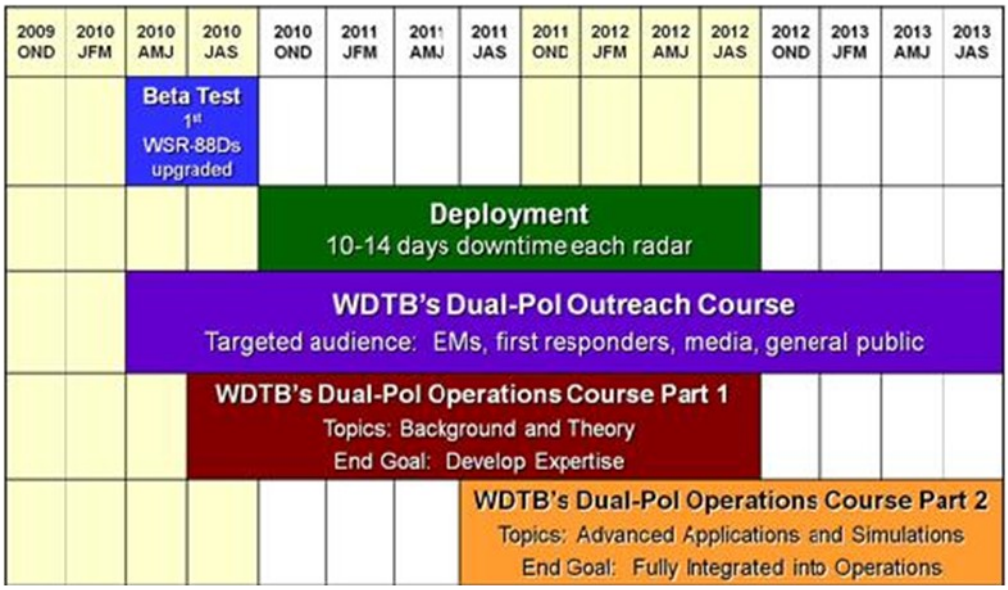
Directions;
The National Weather Service is located at the Lewis University Airport in Romeoville, at the corner of George Michas Drive and Don Walden Road. The office is next to, but not part of Lewis University. ***There is no access to the National Weather Service from Lewis University.*** Entrance is through the Lewis University Airport off Renwick Road about midway between Weber Road and Route 53.

Dual-polarization Radar Coming in 2010

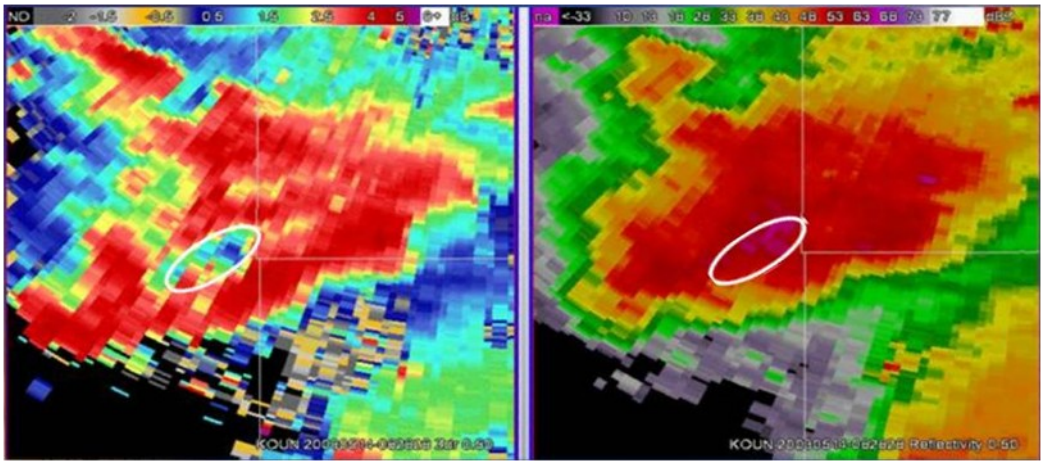
by Nathan Marsili, Forecaster

All NWS Doppler radars will receive an important upgrade beginning in 2010, with all NWS sites expected to be upgraded by 2012. WFO Chicago will be one of the first sites to receive this upgrade, currently on schedule for September 2010. This upgrade will make all NWS radars "dual-polarization" (dual-pol) radars. Currently, National Weather Service Doppler radars are horizontally polarized radars, meaning their pulses are sent out with a horizontal orientation, which is ideal for sampling raindrops which tend to acquire a flattened appearance as they fall through the air. However, by adding a vertical polarization, more information can be gained about the shape of the hydrometeors falling from the sky, and will make it easier for meteorologists to discriminate between rain, hail, snow, and sleet. Hail and snow often tend to be more spherical in nature when compared to raindrops, and the extra information gained from vertical polarization can help distinguish between heavy rain and hail, and different winter precipitation types. The Warning Decision Training Branch (WDTB) has released a preliminary schedule of dual-pol deployment to the individual forecast offices along with a schedule of different training programs geared toward meteorologists along with the emergency managers and the public.

Dual-polarization Radar Coming in 2010 (cont)



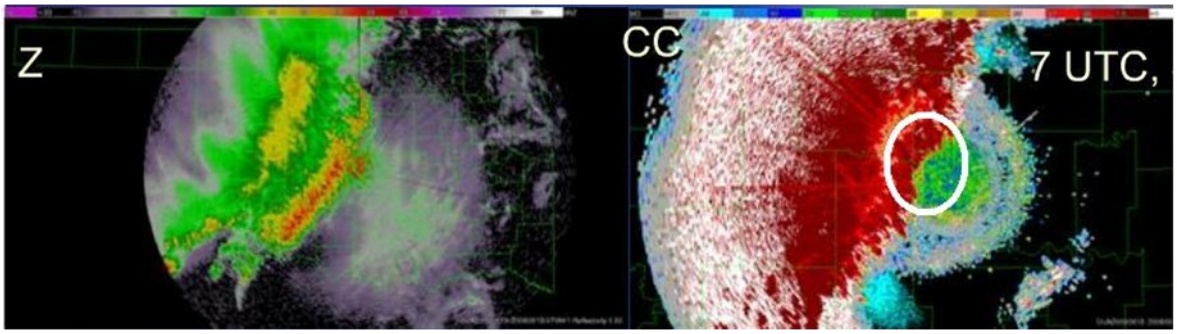
Several new radar products will be available for meteorologists to analyze. One of these products is called "Differential Reflectivity" which simply measures the differences in the power returned to the radar from the horizontal and vertical polarization, which in turn can be used to infer more information on the type of precipitation occurring. An example showing the benefits of this product is shown below. The diagram below shows radar imagery of a supercell. The image on the right is the traditional base reflectivity which is produced by current NWS Doppler radars, and on the left is the Differential Reflectivity product that will be available with dual-pol radar.



Note the blue shading circled in the supercell in the left diagram of Differential Reflectivity. This area represents a portion of the storm where large hail is likely. In this example, the location of the greatest threat of large hail can be more precisely determined due to the Differential Reflectivity product indicating a greater potential of precipitation more spherical in nature in this part of the storm, suggesting more of a large hail threat. The differential reflectivity product can also be used to determine areas where heavy rainfall and flash flooding potential is the greatest by estimating the mean size of raindrops and an estimation as to where the greatest rainfall rates are possible.

Dual-polarization Radar Coming in 2010 (cont)

Another product that will be available to meteorologists to analyze from dual-pol radar is called the Correlation Coefficient. High values of Correlation Coefficient indicate precipitation mostly of all the same size, while low correlation values often indicate the presence of hail or mixed winter precipitation. Below is an example of the traditional reflectivity of an approaching squall line from the current NWS Doppler radar with the Correlation Coefficient from the dual-pol radar on the right side taken from several thousand feet above the surface. The transition from red to greens (or higher correlation coefficients to lower correlation coefficients) in a circular fashion indicate a zone where melting is occurring and a mix of rain and snow is likely at this elevation. This information can be very helpful in forecasting precipitation types during the winter weather season, and in terms of timing changeovers in precipitation type.



Other benefits that will be gained from the implementation of dual-pol radar include:

- Possible detection of tornado debris which will help with tornado warnings.
- Detection of non-meteorological targets such as birds and insects which will help with quality of data input into weather computer models.
- Improved warning locations for largest hail and better flash flood warnings due to increased ability to identify areas of heaviest rainfall rates.

Stay tuned in the coming months for more information on this upgrade to the NWS Doppler radars

The Cool Summer of 2009, by the Numbers

By Jim Allsopp, Warning Coordination Meteorologist

The summer of 2009 was very cool across northern Illinois. For climate purposes, the period June through August is considered to be meteorological summer.

Chicago

For Chicago, it was the fifth coolest summer since 1942, when official records moved out away from the cool lakefront to inland airport locations (Midway in 1942 and O'Hare in 1980). The average temperature for the 2009 summer season was 69.2 degrees, which was 1.3 degrees below normal. Other ways to gage the temperature are by looking at the number of hot days and the number of cool days. In 2009 there were only four "hot" days with a maximum temperature of 90 or greater, compared to a normal of about 17. There have only been five summers with fewer 90 degree days since 1942. In summer of 2009 there were 30 "cool" days where the maximum temperature failed to reach 75. This is the most on record since 1942. Normally there are only about 15 days in the summer months with a temperature less than 75. The summer of 2009 was very comparable to 1992 and 2004 in all three categories.

The Cool Summer of 2009, by the Numbers (cont)

Year	Average temp	Days ≥90	Days <75
normal	71.1	17.3	14.9
1992	67.1	4	29
1985	68.1	7	22
1982	68.3	7	20
2004	68.6	3	27
2009	**69.2**	**4**	**30**

2009 had more days where the temperature failed to reach 75 than any other since 1942. 1992 is second with 29.

1979 and 2000 each only had two days with a maximum temperature at or above 90 in the summer months of June, July, and August. That is the fewest 90 degree days since 1942. The summers of 1967, 1978, and 2004 only had three 90 degree days each.

Rockford

For Rockford, temperature records go back to 1906. The summer of 2009 was the third coolest on record with an average temperature of 67.8. That was 3.1 degrees below normal. There were only four “hot” days with a maximum temperature at or above 90. Normal is 17.5. There were 25 “cool” days where the temperature did not reach 75. Normally there are about 12.

Year	Average temp	Days ≥90	Days <75
Normal	70.9	17.5	11.8
1915	66.3	0	26
1992	67.4	5	23
2009	**67.8**	**4**	**25**
1967	68.0	3	23
2004	68.0	1	26

1915 and 2008 are the only summers without a 90 degree day during June, July, or August. (1915 had one in April, 2008 had 2 in September.)

The most days with the maximum temperature less than 75 was 34 in 1912. 1915 and 2004 tied for second with 26.

I

f you are wondering if the cool summer gives us any hint for the upcoming winter, it doesn’t. The other four cool summers listed in the table above for Rockford were followed by winters that ranged from 1.0 degrees below normal to 1.6 degrees above normal. None ranked in the top 20 coldest or warmest winters. For Chicago, the winter of 1985-1986 was 4.2 degrees below normal, the sixth coldest on record since 1942. However, the winter of 1982-1983 was 5.4 degrees above normal, the fifth warmest on record. The winter of 1992-1993 was slightly above normal, and 2004-2005 was above normal, but neither was in the top 20.

Monitoring the Rivers

By Bill Morris, Service Hydrologist

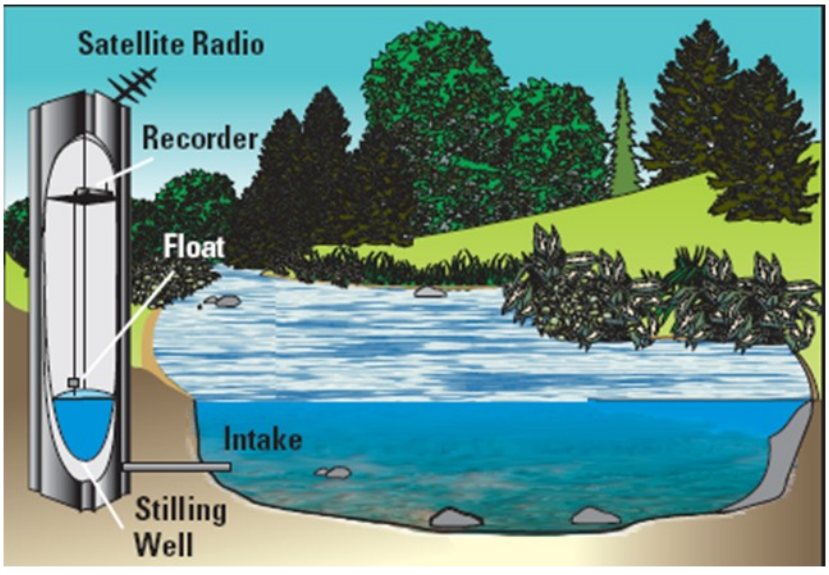
Last September, remnants of tropical systems moved across northern Illinois and northwest Indiana and dumped torrential rainfall which resulted in record flooding on many streams in the area. When the National Weather Service (NWS) issues river flood warnings and statements, current and forecast river levels are noted in terms of river "stage". What exactly does river stage mean and how is this data collected?

Equipment

The U.S. Geological Survey (USGS) is the agency tasked with maintaining records of the nation's water. Their mission is to provide reliable, impartial, timely information that is needed to understand the Nation's water resources. They operate over 7000 streamgages nationwide as part of the National Streamflow Information Program (NSIP). These streamgages are operated by the USGS, in partnerships with more than 800 Federal, State, Tribal, and local cooperating agencies. River stage and discharge measurement data from the USGS is vital to the NWS river forecast and flood warning program.

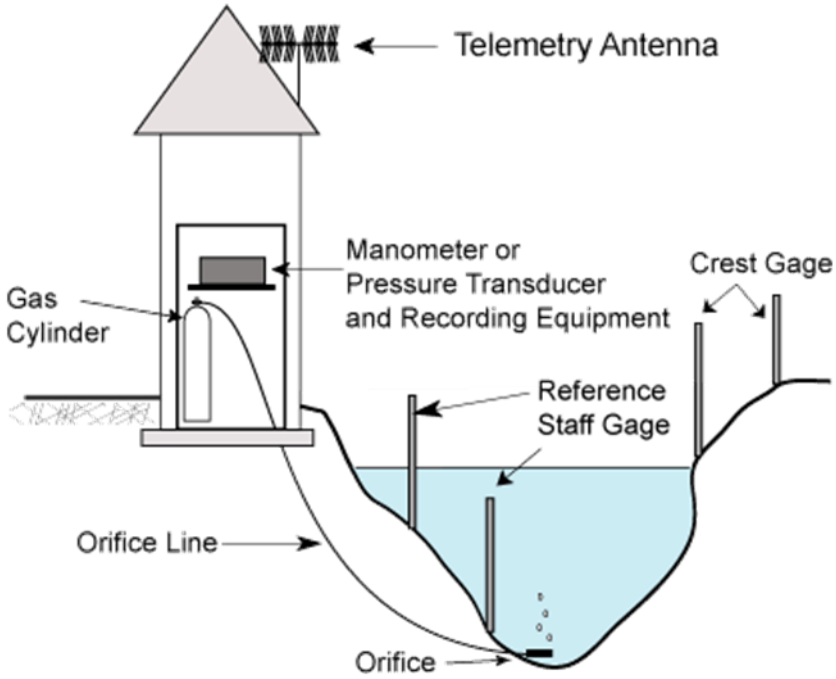
The simplest river gage is a staff gage. A staff gage is really no more than a basic measuring stick marked for easy reference. Staff gages require an observer to read and record the river level. Another type of gage is a stilling well. In the stilling well, pipes connect the water in the stream with the well. A float type device rises and falls in response to changes in water levels in the well which mimic the rises and falls in the stream channel. Many of the stilling well gages have been replaced with bubbler type gages. The bubbler gage measures the amount of pressure required to maintain a small flow of gas through a tube that is bubbled out at a fixed location under water in the stream. As the depth of water increases, more pressure is required to push the gas bubbles out through the tube. This change in pressure is translated to a river gage height measurement. The latest river measuring technology employs radar or acoustics for non-contact measurements of water levels known as river "stages". Most gages are equipped with some telemetry device such as a phone modem or satellite. The data is collected by the NWS and used in the river and flood warning program. This stream data is available on NWS AHPS pages as well as from the USGS web sites such as waterwatch.usgs.gov.

USGS Staff Gage



Courtesy USGS

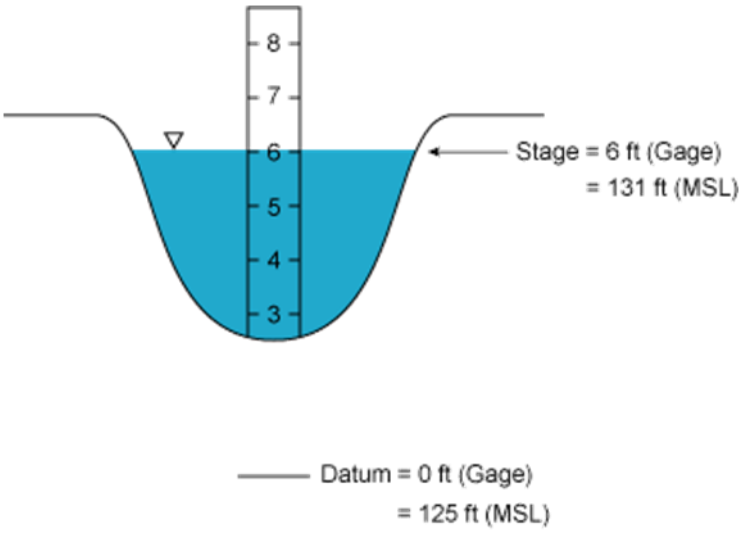
Monitoring the Rivers (cont)



Courtesy USGS

What is River Stage?

River stage, also referred to as gage height is the height of the water surface above the gage datum (zero point). Gage height is often used interchangeably with the more general term, stage, although gage height is more appropriate when used with a gage reading. So, a river stage reading of 6.0 feet indicates that the water surface at that location is 6.0 feet above the gage datum. Since the gage zero datum is generally set below the bed of the stream, the reading does not necessarily indicate the river is 6.0 feet deep. You can convert the stage or gage height reading to a mean sea level (MSL) value by simply adding the gage height to the zero gage datum MSL value. The zero gage datum value is reported in MSL and available under the individual hydrographs on our AHPS pages. Some gages report river gage height in MSL including many at lock and dam locations on the Illinois River as well as the newest gage on the Illinois River in Ottawa, IL.



It is important to note that one cannot make meaningful comparisons between river stage readings on the same river. To make useful comparisons between 2 locations you need to use flow, normally measured in cubic feet/second (cfs).

More on flow measurements in our next edition…

A Review of How to Get Climate Information Off Our Website

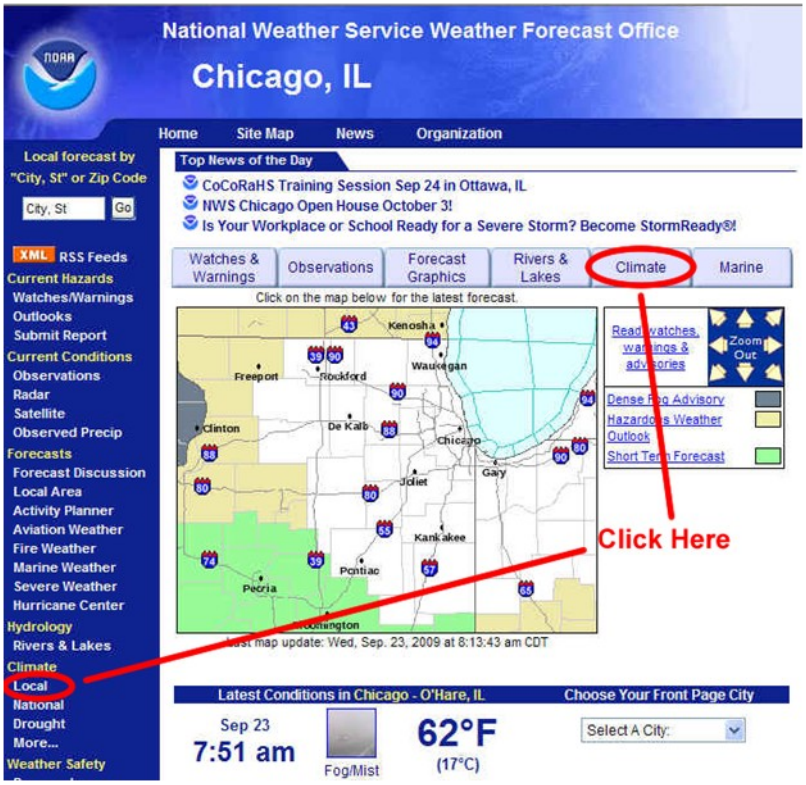
By Amy Seeley, Webmaster

One common questions we receive here is “what was the weather on a particular day”.

There is a mountain of information on our website, but we realize that sometimes it isn’t always easy to find what you want. [Much as we try to avoid this on our sites, it still happens.] So here are step-by-step instructions on how to do this.

To start out, go to our website at weather.gov/Chicago.

The Climate section is easy to get to from our front page. Click the “CLIMATE” tab just above the Watch/Warning/Advisory map. Or can find it on the blue menu on the left hand side under Climate by clicking Local.



This is our main climate page

You can see plenty of tabs across the top that help you reach one of seven sections.

Right now we are going to focus on two of them.

A Review of How to Get Climate Information Off Our Website (cont)

Our first example will be of our F6 form, which shows daily data during a month from one of our two primary climate locations (Chicago O'Hare and Rockford).

We'll select **Preliminary Climatology Data (CF6)**, **Chicago-O'Hare**, **Most Recent**, and click **Go**.

A separate window will pop up, like the one on the right:

Select Other Date

Explanation of the Preliminary Monthly Climate Data (F6) Product

These data are preliminary and have not undergone final quality control by the National Climatic Data Ce revision. Final and certified climate data can be accessed at the NCDC - http://www.ncdc.noaa.gov.

WFO Monthly/Daily Climate Data

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000
CXUS55 KLOT 230700
CF6ORD
PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

                                        STATION:   CHICAGO-OHARE IL
                                        MONTH:     SEPTEMBER
                                        YEAR:      2009
                                        LATITUDE:   41 58 N
                                        LONGITUDE:  87 54 W

  TEMPERATURE IN F:        :PCPN:    SNOW:  WIND       :SUNSHINE: SKY      :PK WND
=================================================================================
1   2   3   4   5  6A  6B    7    8    9   10  11  12  13   14  15   16   17  18
                                      12Z  AVG MX 2MIN
DY MAX MIN AVG DEP HDD CDD  WTR  SNW DPTH SPD SPD DIR MIN PSBL S-S WX    SPD DR
=================================================================================

 1  72  47  60  -8   5   0 0.00  0.0    0  3.4 13  60   M    M   1        24  60
 2  73  50  62  -6   3   0 0.00  0.0    0  5.1 12  40   M    M   1        21  60
 3  75  56  66  -2   0   1 0.00  0.0    0  6.0 13  50   M    M   1 1      24  70
 4  75  54  65  -3   0   0 0.00  0.0    0  4.1 12  50   M    M   1 18     24  60
 5  78  54  66  -1   0   1 0.00  0.0    0  5.3 14  70   M    M   7 18     26  60
 6  77  61  69   2   0   4 0.03  0.0    0  5.3 13  50   M    M   8 18     26  70
 7  77  59  68   1   0   3 0.00  0.0    0  4.0 13  40   M    M   3 18     23  50
 8  78  60  69   3   0   4 0.00  0.0    0  7.3 15  50   M    M   6 1      30  50
 9  78  65  72   6   0   7 0.00  0.0    0  6.9 14  60   M    M   6 18     33 210
10  81  64  73   7   0   8 0.00  0.0    0  6.8 15  60   M    M   3 18      M  M
11  80  61  71   6   0   6 0.00  0.0    0  5.6 14  90   M    M   1 1       M  M
12  79  58  69   4   0   4 0.00  0.0    0  4.8 13  30   M    M   5 128     M  M
13  80  58  69   4   0   4 0.00  0.0    0  3.0 10  70   M    M   3 12      M  M
14  84  58  71   6   0   6 0.00  0.0    0  2.1  9  90   M    M   4        20  80
15  82  64  73   9   0   8 0.00  0.0    0  7.8 18  50   M    M   6        36  50
16  71  59  65   1   0   0 0.00  0.0    0 11.4 21  30   M    M   3        33  50
17  72  50  61  -2   4   0 0.00  0.0    0  4.2 12  40   M    M   3 8      25  50
18  79  50  65   2   0   0 0.00  0.0    0  6.4 15  50   M    M   3 18     28  40
19  76  55  66   3   0   1 0.00  0.0    0  5.9 14 100   M    M   6        23  80
20  73  54  64   2   1   0 0.75  0.0    0  7.9 16  60   M    M   8 1      31  40
21  67  60  64   2   1   0    T  0.0    0  4.6 10 200   M    M   7 18     15 280
22  77  59  68   6   0   3    T  0.0    0  7.7 20 170   M    M   8 18     24 170
=================================================================================
SM 1684 1256        14  60  0.78     0.0 125.6          M       94
=================================================================================
AV 76.5 57.1                                 5.7 FASTST   M    M   4    MAX(MPH)
                                  MISC ----> # 21  30                 # 36   50
=================================================================================
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A Review of How to Get Climate Information Off Our Website (cont)

If you wanted past data and not the current month, click on **ARCHIVED DATA** and then pick the month and year you are interested in.

The data on this page goes back 5 years.

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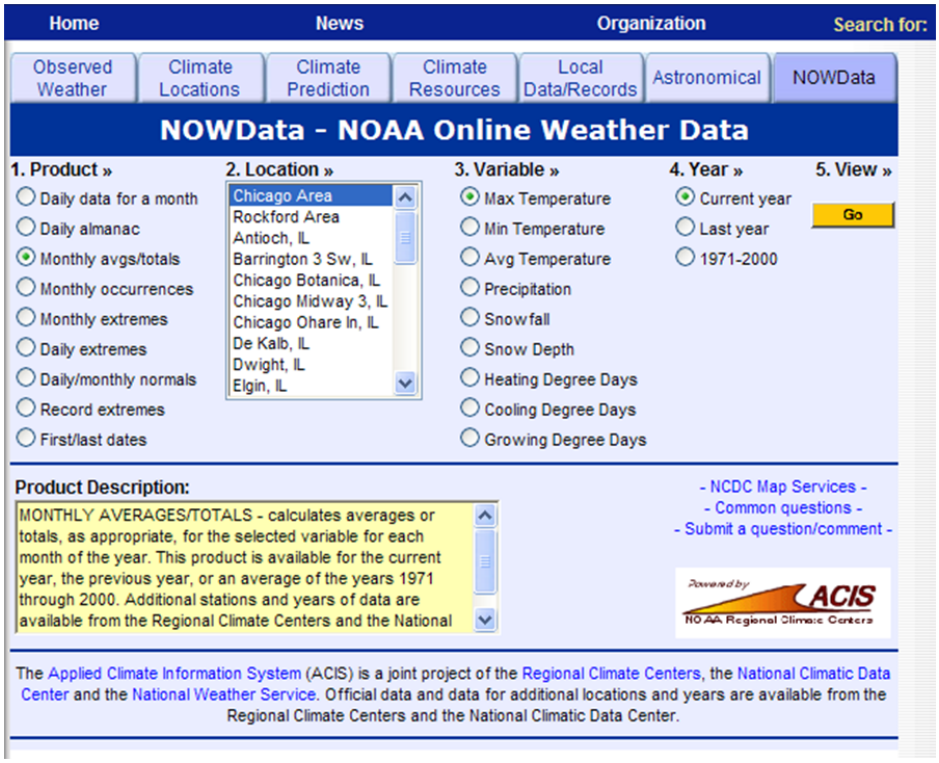
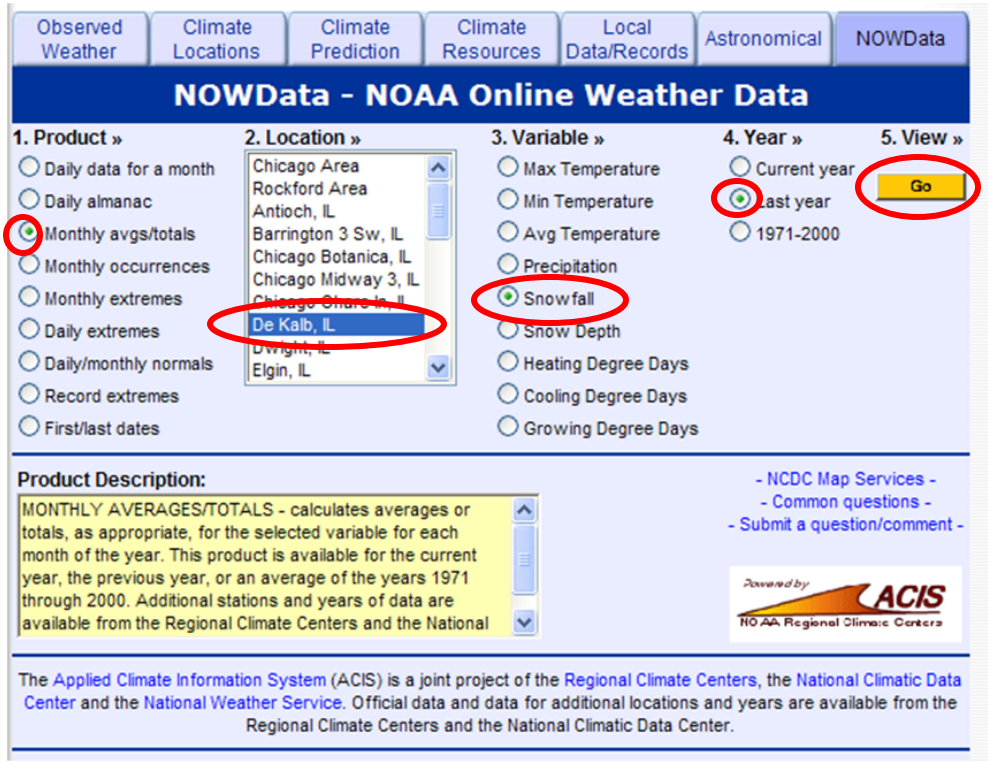
Now let's move on to NOWData. Select the tab at the far right, NOWData

A Review of How to Get Climate Information Off Our Website (cont)

This takes you to NOWData - NOAA Online Weather Data.

There is a massive amount of information here about past weather data at many weather stations and cooperative observer locations across northern Illinois and northwest Indiana. We will only scratch the surface but hopefully this will give you an idea of what you can research about past weather, extremes, and normals.





For example, let's look at the observed monthly snowfall at DeKalb for last year.

We select **Monthly avgs/totals**, **DeKalb**, **Snowfall**, **Last Year**, and **Go**.

A Review of How to Get Climate Information Off Our Website (cont)

A new window pops up with the following information. You can see that 28.0" of snow fell in December 2008, and the total for the 2008-2009 winter snow season was 57.3 inches.

NOWData - NOAA Online Weather Data

DE KALB (112223)
Monthly Totals/Averages
Snowfall (inches)
Years: 2008-2009

Season	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Season
2008-2009	0.0	0.0	0.0	0.0	0.8	28.0	15.7	6.3	5.0	1.5	0.0	0.0	57.3

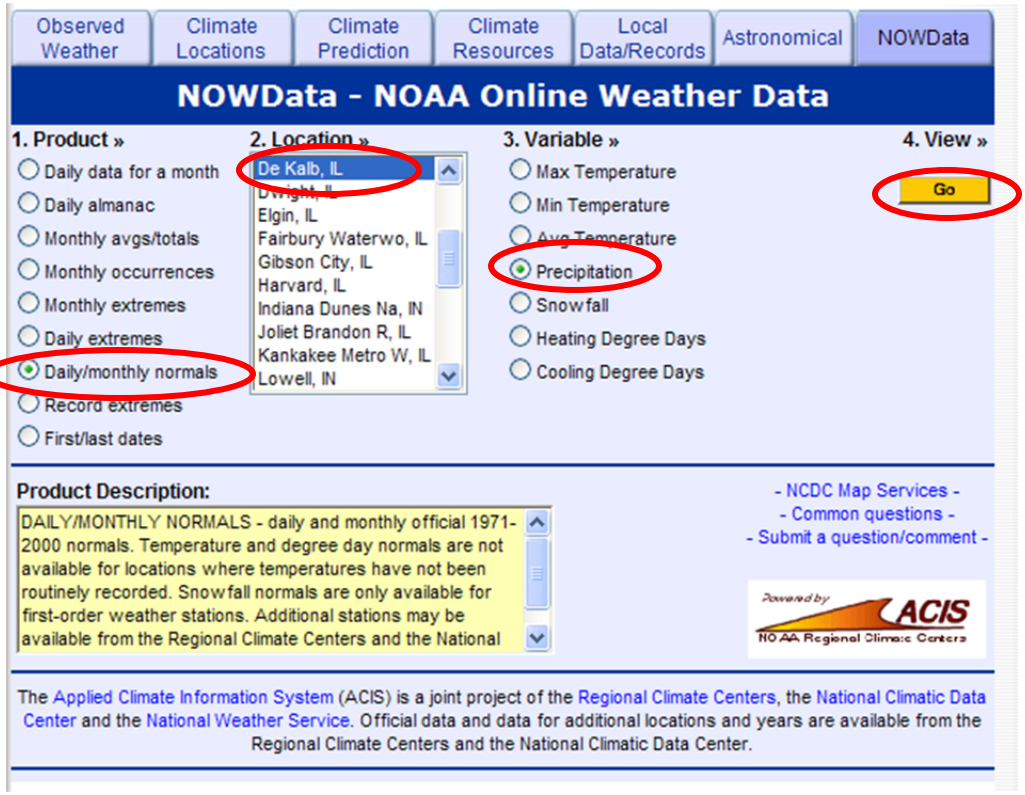
Official data and data for additional locations and years are available from the Regional Climate Centers and the National Climatic Data Center.

Now, for the same station, let's look at normal daily and monthly precipitation.

We select

Daily/Monthly Nomals,

DeKalb, **Precipitation**, and **Go**.



A Review of How to Get Climate Information Off Our Website (cont)

Another window pops up (or the existing pop-up window repopulates with this data). You can see that the 30 year averages from 1971-2000 are summarized by the month and the day. Notice that June is the wettest month of the year on average, while February is the driest (in this example).

DE KALB (112223)
Daily Climate Normals
Precipitation (inches)
1971-2000

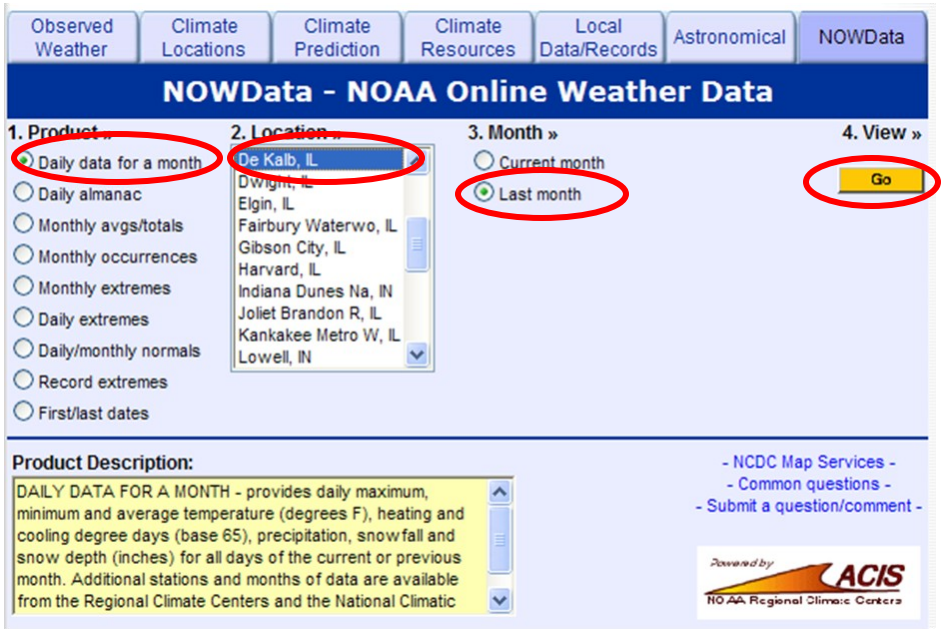
Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	0.05	0.04	0.06	0.10	0.13	0.15	0.14	0.14	0.14	0.09	0.09	0.09
2	0.05	0.04	0.06	0.10	0.13	0.15	0.14	0.14	0.14	0.09	0.09	0.08
3	0.05	0.04	0.06	0.10	0.13	0.15	0.14	0.14	0.13	0.09	0.09	0.08
4	0.05	0.04	0.06	0.11	0.13	0.15	0.14	0.14	0.13	0.09	0.09	0.08
5	0.05	0.05	0.07	0.11	0.13	0.15	0.14	0.14	0.13	0.09	0.09	0.08
6	0.05	0.05	0.07	0.11	0.13	0.15	0.14	0.14	0.13	0.09	0.09	0.08
7	0.05	0.05	0.07	0.11	0.13	0.15	0.14	0.14	0.13	0.09	0.09	0.08
8	0.05	0.05	0.07	0.11	0.13	0.15	0.14	0.15	0.13	0.09	0.09	0.08
9	0.05	0.05	0.07	0.11	0.13	0.15	0.14	0.15	0.13	0.08	0.10	0.07
10	0.05	0.05	0.07	0.11	0.13	0.15	0.14	0.15	0.12	0.08	0.10	0.07
11	0.05	0.05	0.07	0.11	0.13	0.15	0.14	0.15	0.12	0.08	0.10	0.07
12	0.05	0.05	0.07	0.12	0.13	0.15	0.13	0.15	0.12	0.08	0.10	0.07
13	0.05	0.05	0.07	0.12	0.13	0.15	0.13	0.15	0.12	0.08	0.10	0.07
14	0.05	0.05	0.08	0.12	0.13	0.15	0.13	0.15	0.12	0.08	0.10	0.07
15	0.05	0.05	0.08	0.12	0.13	0.15	0.13	0.15	0.12	0.08	0.10	0.07
16	0.05	0.05	0.08	0.12	0.14	0.15	0.13	0.15	0.12	0.08	0.10	0.07
17	0.05	0.05	0.08	0.12	0.14	0.15	0.13	0.15	0.12	0.08	0.10	0.07
18	0.05	0.05	0.08	0.12	0.14	0.15	0.13	0.15	0.11	0.08	0.10	0.07
19	0.05	0.05	0.08	0.12	0.14	0.15	0.13	0.15	0.11	0.08	0.10	0.06
20	0.05	0.05	0.08	0.12	0.14	0.15	0.13	0.15	0.11	0.08	0.10	0.06
21	0.05	0.05	0.09	0.12	0.14	0.15	0.13	0.15	0.11	0.08	0.09	0.06
22	0.05	0.05	0.09	0.12	0.14	0.15	0.13	0.14	0.11	0.08	0.09	0.06
23	0.05	0.05	0.09	0.12	0.14	0.15	0.13	0.14	0.11	0.08	0.09	0.06
24	0.05	0.05	0.09	0.12	0.14	0.15	0.14	0.14	0.10	0.08	0.09	0.06
25	0.05	0.06	0.09	0.13	0.14	0.15	0.14	0.14	0.10	0.08	0.09	0.06
26	0.05	0.06	0.09	0.13	0.14	0.15	0.14	0.14	0.10	0.08	0.09	0.06
27	0.05	0.06	0.09	0.13	0.14	0.15	0.14	0.14	0.10	0.08	0.09	0.06
28	0.05	0.06	0.10	0.13	0.14	0.15	0.14	0.14	0.10	0.09	0.09	0.06
29	0.05	0.06	0.10	0.13	0.14	0.15	0.14	0.14	0.10	0.09	0.09	0.06
30	0.05	-	0.10	0.13	0.15	0.14	0.14	0.14	0.10	0.09	0.09	0.06
31	0.04	-	0.10	-	0.15	-	0.14	0.14	-	0.09	-	0.06
Month	1.54	1.40	2.46	3.52	4.21	4.49	4.22	4.48	3.51	2.60	2.82	2.13

Sum/average of daily normals might not match monthly normal due to rounding.

A Review of How to Get Climate Information Off Our Website (cont)

For a final example, let's look at recent daily data.

Let's select **Daily data for a month**, **DeKalb**, **Last Month**, and **Go**.



In our additional pop-up window, you see the daily information. Averages or totals for the month (as appropriate), are at the right.

In this example, 6.22" of rain fell during the month, and the average temperature for the month was 67.6°.

I hope this has helped you in your quest for past weather information.

As always, thank you for visiting our website, and if you have any questions please feel free to contact us.

DE KALB (112223)
Observed Daily Data
Month: Aug 2009

Day	MaxT	MinT	AvgT	HDD	CDD	Pcpn	Snow	Snwg
1	78	59	68.5	0	4	0.00	0.0	0
2	71	52	61.5	3	0	0.05	0.0	0
3	77	58	67.5	0	3	0.00	0.0	0
4	83	63	73.0	0	8	0.02	0.0	0
5	83	59	71.0	0	6	0.00	0.0	0
6	78	58	68.0	0	3	0.00	0.0	0
7	79	59	69.0	0	4	T	0.0	0
8	69	64	66.5	0	2	0.90	0.0	0
9	88	69	78.5	0	14	T	0.0	0
10	88	66	77.0	0	12	0.01	0.0	0
11	82	65	73.5	0	9	0.00	0.0	0
12	81	59	70.0	0	5	0.00	0.0	0
13	80	56	68.0	0	3	0.00	0.0	0
14	80	60	70.0	0	5	0.00	0.0	0
15	85	62	73.5	0	9	0.00	0.0	0
16	84	63	73.5	0	9	0.00	0.0	0
17	76	64	70.0	0	5	0.36	0.0	0
18	78	66	72.0	0	7	0.07	0.0	0
19	80	58	69.0	0	4	0.00	0.0	0
20	80	60	70.0	0	5	0.96	0.0	0
21	77	60	68.5	0	4	0.02	0.0	0
22	71	53	62.0	3	0	0.66	0.0	0
23	69	52	60.5	4	0	0.02	0.0	0
24	74	53	63.5	1	0	0.00	0.0	0
25	76	56	66.0	0	1	0.00	0.0	0
26	80	58	69.0	0	4	0.60	0.0	0
27	68	59	63.5	1	0	1.97	0.0	0
28	64	57	60.5	4	0	0.53	0.0	0
29	66	53	59.5	5	0	0.05	0.0	0
30	66	49	57.5	7	0	0.00	0.0	0
31	65	45	55.0	10	0	0.00	0.0	0
Smry	76.6	58.5	67.6	38	126	6.22	0.0	0.0